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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/196,185	11/20/1998	MYUNG-KOO HUR	6192.0052.AA	8847
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MCGUIRE WOODS, LLP 1750 TYSONS BOULEVARD SUITE 1800 MCLEAN, VA 22102			EXAMINER QI, ZHI QIANG	
			ART UNIT 2871	PAPER NUMBER

DATE MAILED: 08/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/196,185

Applicant(s)

HUR ET AL.

Examiner

Mike Qi

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3,6-14 and 18-26 is/are pending in the application.
- 4a) Of the above claim(s) 1-3,6-13 and 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14 and 21-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 14, 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,852,481 (Hwang) in view of US 5,162,933 (Kakuda et al) and JP 05241173 (Yatabe et al).

Claims 14, 23-24 and 26, Hwang discloses (col.1, line 36 – col.5, line 15;

Fig.1) that a thin film transistor (TFT) panel comprising:

- an insulating substrate (glass substrate 10);
- a gate wire (11, 12) formed on the substrate (10), and the gate wire must have gate line, gate electrode and gate pad;
- a gate insulating layer (15) covering the gate wire (11,12);
- a semiconductor layer (17) formed on the gate insulating layer (15);
- a data wire (18, 19) connected the source/drain electrodes, and formed on the semiconductor layer (17), and the data wire must have data line, data electrode and data pad;
- a passivation layer (21) formed on the data wire and the gate wire, and having one contact hole extended to the gate pad and another contact hole extended to the drain electrode;

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- a transparent conductive layer (indium tin oxide, ITO, pixel electrode 22) formed on the passivation layer (21), and connected to the gate pad (12) and the data wire (source/drain electrodes) through contact holes;
- the gate wire having two layers (11 and 12) (main layer and supplemental layer); the data wire having two layers (18, 19) (main layer and supplemental layer).

Hwang does not expressly disclose that the material for the two-layer structure of the gate wire and data wire as the main layer and the supplementary layer, such that the main layer comprises metal and the supplemental layer comprises metal nitride being inert to an etchant for preventing the gate pad or the data wire from being eroded by the etchant.

However, Kakuda discloses (col.10, line 30 – col.11, line 55; Fig.8) that the gate line (13) and the data line (11), both of them, are formed by laminating metal layers (13a, 13b; 11a, 11b) such as MoCrx and aluminum layers (two-layer structure, and the MoCrx having function of supplemental layer and the aluminum having function of main layer), and such laminated metal layers prevents the generation of hillock and its surface remained smooth, and the thin film transistors formed on such a layer remarkably decreasing the number of shorts.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to employ two-layer structure for decreasing shorts of the TFT.

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Lacking limitation is such that the supplemental layer comprises metal nitride and being inert to an etchant for preventing the gate pad or the data wire from being eroded by the etchant.

However, Yatabe discloses (abstract) that the material of the electrode for liquid crystal display comprising metal nitride that is a solvent-resistant or air permeation resistant. Therefore, the metal nitride has such property to resist the solvent effect and air permeation effect, such that the metal nitride has a property being inert to an etchant, and using such metal nitride to obtain electrode (any electrode) enables high quality display. The skilled in the art would be based on the inert property of the metal nitride to design such two-layer structure. (Some references listed below also show the property of the metal nitride material).

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to arrange the gate wire or data wire as two-layer structure (metal as main layer, and metal nitride as supplementary layer) as claimed in claims 14, 23-24 and 26 for achieving inert etching such as solvent-resistant/air permeation-resistant and a high quality display.

Claims 21-22, Hwang discloses (col.1, line 36 – col.5, line 15; Fig.1) that a transparent conductive layer (indium tin oxide, ITO, pixel electrode 22) formed on the passivation layer (21), and connected to the drain electrode (19) through a contact hole; and using ITO as a gate ITO connected to the gate pad (such as gate pad 12) through another contact hole.

Claim 25, lacking limitation is such that the material of the supplementary layer comprises tungsten or chromium or zirconium or nickel.

However, Kakuda discloses (col.7, lines 8 – 29) that using tungsten (W) to form the gate lines (11) and the data lines (13), and tungsten is a refractory metal and having higher workability by chemical wet etching.

Therefore, it would have been obvious to those skilled in the art to use tungsten as the material of the supplementary layer as claimed in claim 25 to achieving a higher workability by chemical wet etching.

### ***Response to Arguments***

3. Applicant's arguments filed on Jul.6, 2004 have been fully considered but they are not persuasive.

#### Applicant's arguments are as follows:

1) The reference Kakuda does not disclose that the MoCr<sub>x</sub> thin film is "substantially inert to an etchant used for etching the transparent layer for preventing the gate pad and the data wire from being eroded by the etchant".

2) The reference Yatabe has nothing to do with "preventing the gate pas or the data wire from being erode by the etchant".

3) The references can not be combined.

#### Examiner's responses to Applicant's arguments are as follows:

1) The reference Kakuda is relied on two-layer structure, and the MoCr<sub>x</sub> having function of supplemental layer and the aluminum having function of main layer.

2) The reference Yatabe discloses (abstract) that the material of the electrode for liquid crystal display comprising metal nitride that is a solvent-

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resistant or air permeation resistant. Therefore, the metal nitride has such property to resist the solvent effect and air permeation effect, such that the metal nitride has a property being inert to an etchant, and using such metal nitride to obtain electrode (any electrode) enables high quality display. The skilled in the art would be based on the property of the metal nitride to design such two-layer structure.

3) The reference Kakuda teaches a two-layer structure for the gate wire and data wire (MoCrx film on the aluminum film) that means the main layer is a metal layer (aluminum). The reference Yatabe teaches the property of the material as a metal nitride, such as solvent resist effect and air permeation resist effect. Therefore the metal nitride has an inert property to protect the wires under the metal nitride material. Therefore, the skilled in the art would benefit from the prior art to design such two-layer structure for protecting the gate pad or the data wire.

### ***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory

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action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1) US 6,107,668 (Ukita) discloses (col.4, lines 51-57) that the tungsten nitride film is highly resistive to the chemicals and suppresses the metal from the corrosion of the electrode by the etchant. Therefore, the material of metal nitride such as tungsten nitride has such property being inert to an etchant and preventing the wires such as gate pad or data wire under the metal nitride material, and that would have been obvious.

2) US 4,141,022 (Sigg et al) discloses (col.1, line 62 – col.2, line 3) that the material of chromium over a metal layer is an etch resistant metal layer. Therefore, the material of chromium as the supplementary layer has the property of etch resistant to protect the wire under the chromium from being etched by the chemical etchant, and that would have been obvious.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299. The examiner can normally be reached on M-T 8:00 am-5:00 pm.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Qi  
July 29, 2004



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